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EDITORIAL.

Rubber in Malaya 1932.

The present issue of the *Malayan Agricultural Journal* contains an article by Dr. H. A. Tempany, C.B.E., reviewing the condition of the rubber industry in Malaya in the year 1932 and recording progress achieved in certain important lines of research, while it also includes statistical data with regard to production, consumption, stocks, prices and areas under cultivation.

The account is, of necessity, in some respects, a rather sad picture of the condition of the foremost Malayan industry which is passing through a period of depression never before equalled in its history. The industry during the year has had to face the fact that if production was to be maintained, drastic curtailment in the cost of production was vital, and it is encouraging to record that it has been found possible to reduce this cost to a figure which a few years ago would have been thought impossible.

On the other hand it must not be forgotten that the low cost of production has only been achieved by the adoption of a policy of curtailment of expenditure on items and on personnel which may eventually create a set of conditions which must be regarded as unstable, and, furthermore, despite the exercise of the most rigid economy comparatively few estates have been able to carry on without actual financial loss.

It is becoming more and more evident that the future of the industry will be dependent to a large extent on the aid of scientific research.

The present policy of the industry aims at attempting to increase the productive capacity of estates economically, by concentrating on maintenance and improvement of the more productive areas, and establishing bud-grafted areas with proved material, coupled with improved methods of cultivation and manufacture and extension of the uses of rubber and latex in industries additional to those in which it is at present employed.

Although the continued low price obtained for rubber has resulted in an increase of interest in other agricultural products, much still remains to be done in connection with the extension of alternative crops particularly amongst Malay small holders. There is no general tendency to replace rubber by another crop, but it is encouraging to record that, in areas where suitable land for the

cultivation of food stuffs for personal use is not available, small-holders are tending to cut out unproductive rubber, in order to plant foodstuffs. The Department of Agriculture is rendering assistance by advice, demonstration and the supply of material in cases where the land owner has experienced difficulties in this matter.

There is no doubt that the depressed economic condition of every agricultural product has retarded the immediate extension of "money" crops other than rubber, on a large scale in Malaya, and the possibility cannot be ignored that in the event of a return of full prosperity to the rubber industry, interest in alternative crops may once more tend to wane. This has happened in the past and may well happen in the future; it is essential that when return to prosperity occurs, the lessons of the present slump should not be forgotten. The policy of the Malayan Governments directed towards the encouragment of interest in the cultivation of rice and other food crops particularly amongst the Malay small-holders will, it is hoped, make a lasting impression on the mind of the raiat and so tend to counteract the danger to some extent.

Vegetative Propagation of Tea. The propagation of plants by vegetative methods is of course a well established practice, and methods commonly adopted in the past are well understood. These methods aim at, either the production of roots from a portion of the parent plant by such methods as layering, bagging or marcotting, or planting of cuttings of stems, roots, or leaves, or the production of a composite plant by means of grafting, budding and approach grafting, in which the tissues of separate plants can be induced to unite.

In many instances it is considered to be advantageous to propagate vegetatively rather than by seed propagation. The latter method is liable to give rise to progeny which may not resemble the parent type, and in many orchard and plantation crops, such offspring can show considerable variation. Vegetative propagation, on the other hand does not produce a new type and can result in a large reduction in variability.

In the early history of tea planting, considerable variation in types of tea planted from seed was experienced, and, although the careful selection of seed bearers which is at present practised has reduced the variation considerably, it is now realised that methods of vegetative propagation might be usefully applied, mainly with a view to the establishment of uniform areas for seed production and experimental purposes.

The results obtained with the vegetative propagation of various temperate fruits, at the East Malling Research Station, Kent, by multiplying fruit-tree root stocks vegetatively in order to perpetuate races of known characteristics, suggested that the methods employed might be used in the tropics in the asexual propagation of hard wooded plants.

The article by Mr. J. N. Milsum, included in the present number, describes the etiolated shoot method of propagation which has given promising results with Tea and other economic plants at the Government Experimental Plantation, Serdang.

It has been found possible to cause shoots from collar pruned tea bushes to produce a large number of roots in the space of six months, by adopting a method of mounding the shoots with soil thereby causing the lower portions of the stems to become etiolated or blanched. A band of thin copper wire is then placed round the base of each shoot at a short distance above the point of emergence from the stump; the soil is replaced, and root formation occurs.

It is however realised that there are possible limitations to the practical application of asexual propagation of tea, and the results of future work in this connection, will be awaited with interest.

Flowering of the Nipah Palm.

The nipah palm (*Nipa fruticans*) is of some importance in Malaya not only as a source of supply of attap for roofing material, but also as a potential source of power alcohol and of sugar. References to this palm have appeared from time to time in the pages of this Journal, and the article by Dr. H. W. Jack, M.B.E., in the present number, is a useful record of observations made of the flowering characteristics of the palm under cultivation, on the plantation controlled by Messrs. Nipah Distilleries of Malaya, Ltd., Kuala Selangor, where for a number of years the commercial possibilities of the nipah palm have been under investigation.

Injury to Coconut Palms by Lightning.

A paper by Mr. A. Sharples, formerly Government Mycologist, Department of Agriculture, S.S. & F.M.S., which appeared in The Annals of Applied Biology Vol. XX, No. 1, February 1933, is reviewed in this issue of the Journal. The article is of importance to those interested in the coconut and rubber industries in Malaya, since it is the first complete and definite pronouncement on certain somewhat obscure pathological problems connected with diseases of the coconut palm and of the rubber tree in this country.

Owing to the fact that in the literature from other tropical countries, and in standard text books on coconut planting, references are made to diseases known as "bud-rot" and root disease, it has frequently been assumed that the cause of death of coconut palms in Malaya was due to attack by the fungi recorded as causal agents of bud-rot and root diseases in these other countries.

True bud-rot, has never been recorded on coconut palms in Malaya, and no definite root disease of coconuts has, so far, been found in this country.

The fungus Phytophthora has been shown to cause epidemic bud-rot of the coconut palm in India and in the Phillipines, but, although strains of this fungus are present in this country on rubber and other plants, the fungus has never been recorded on palms in Malaya. The symptoms of true bud-rot are first

evident in the central leaves and the spike. These leaves fall over and can be pulled out, revealing a foul smelling rot at the base due to decay of the bud tissue. The remaining older leaves remain green for a short period and then die, and death of the affected palm ensues.

Only one instance of a "disease" of the coconut palm in which these symptoms occurred, has been observed in Malaya, and on this occasion, it was found that the decay of the bud tissue had been caused initially by pellets fired from a shot gun.

Bud-rot of the oil palm is a well known disease on Malayan plantations, and in this disease one can usually find evidence of injury to the bud by mechanical or insect agency, and the disease differs from coconut bud-rot in that affected palms usually recover.

A definite parasitic micro-organism has not been found in association with oil palm bud-rot, and, in the case of coconut palms, no organisms have been found to be primarily responsible for the only form of "bud-rot" recorded in Malaya.

It has now been established that, in Malaya, the cause of this form of "bud-rot", which affects coconut palms, is injury by lightning. The symptoms of the "disease" do not resemble true bud-rot as reported from other countries, since the central leaves and the bud are usually only affected after the outer leaves have died.

In the article reference is made to the 20th Kelvin Lecture, delivered by Dr. G. C. Simpson, C.B., F.R.S., to the Institute of Electrical Engineers, on the subject of "Lightning". Dr. Simpson distinguishes three types of lightning discharge *i.e.*

(1) within the cloud,
(2) to the ground from a "positive" cloud,
(3) to the ground from a "negative" cloud.

The characteristics of the two types of discharge to the ground are said to be very different *e.g.* No. 2 is of frequent occurrence but may be weak in effect, whereas No. 3 is infrequent but strong in effect. In consequence, it is possible to postulate a theory which affords an explanation of the occurrence, in Malaya, of frequent cases where small groups of 6 — 12 palms are killed, and of infrequent cases where a large group of over 100 palms may be affected.

Some interesting observations on the association of "claret coloured canker" at the collar of rubber trees slightly affected by lightning strike are recorded in the article.

While it has not been found possible to reproduce the entire article in this Journal, it is hoped that the somewhat extensive review included in the present number will provide useful information not only to the estate managers on whose properties lightning has taken an annual toll of palms or rubber trees, but also to those on estates which have been fortunate in escaping the serious damage which can be caused by lightning.

Original Articles.

THE RUBBER INDUSTRY IN MALAYA IN 1932.

BY

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Economic Conditions.

The average price of rubber for the year was considerably below even the very low figure for 1931. Comparative prices per lb. for the year as against the 1931 figures in the three main markets in terms of the local currency are—London 2.30d. as compared with 3.13d; New York 3.40 cents gold as compared with 6.07 and Singapore 7.01 cents Straits currency as compared with 9.78. The greater discrepancy between the New York figures for the two years as compared with the London and Singapore figures is due to the departure of Sterling from the Gold Standard in September of 1931, from which date the London and Singapore quotations have naturally borne a higher ratio than before to the New York quotation. The average monthly prices in the three markets were as follows:—

TABLE I.

	Average Monthly Price per Lb.												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average for 1932.
*London ...	3.05	2.71	2.16	1.88	1.81	1.72	1.88	2.44	2.71	2.25	2.56	2.48	2.30
*New York ...	4.49	3.95	3.30	2.96	3.04	2.64	2.78	3.56	3.77	3.66	3.39	3.20	3.40
*Singapore ...	9.92	8.18	6.39	5.40	5.39	4.95	5.39	7.41	8.38	7.47	7.76	7.54	7.01

The general world position of rubber was briefly reviewed in last year's report and the statistical summary then given, taken from W. H. Rickinson and Sons "World Rubber Position", is reproduced below with the addition of the figures for 1932.

*New York = Cents of gold dollar.

*Singapore = Cents of Straits dollar.

*London = Pence.

TABLE II.

	World Production Tons	World Consumption Tons	World Stocks Tons	Average Price s. d.
1922	379,920	394,527	205,840	9¼
1923	412,771	439,407	163,097	1 3¼
1924	421,217	458,252	108,850	1 1⅞
1925	516,076	551,244	76,383	2 10¾
1926	614,778	533,915	149,026	1 11¾
1927	605,196	589,128	193,146	1 4½
1928	649,674	667,027	122,828	10 $\frac{11}{16}$
1929	863,410	785,475	228,572	10¾
1930	821,815	684,993	366,034	5 $\frac{15}{16}$
1931	797,441	668,660	495,724	3⅜
1932	709,840	670,250	517,598	2 $\frac{19}{32}$

It will be seen from the foregoing that the production in 1932 has fallen by 87,601 tons as compared with that in 1931, a decrease of 10.9 per cent.

The total world's stocks in 1932 amounted to 77.2 per cent. of the world's annual consumption as compared with 74.1 per cent. in 1931.

The sharp rise in price in August and September, representing an advance of over 45 per cent. within three months, merits attention. Various reasons for this have been suggested. It is evident that it was not caused by increased consumption or decreased stocks, and is possibly due to reaction from the most acute phase of the depression.

At the commencement of the year, negotiations were in progress between the English and the Dutch Governments for the purpose of exploring the possibilities of devising some satisfactory form of restriction of output, with a view to improving market conditions.

It transpired, however, as the result of these negotiations that no satisfactory solution of the problem could be arrived at in the circumstances then existing; an announcement to this effect was published simultaneously by the English and Dutch Governments in March 19th 1932.

The communiqué read as follows—

> "The British and Netherlands Governments in association with representatives of rubber growers in British and Dutch overseas territories have been engaged in negotiations in order to see whether a practicable scheme for the improvement of the rubber situation could be devised. In the course of these negotiations the British and Netherlands Governments have consulted the Governments of Ceylon, Malaya and the Netherlands Indies. After a careful review of the

situation, the two Governments have been forced to the conclusion that under present conditions it is impossible to frame and operate an international scheme which would guarantee the effective regulation of the production or export of rubber."

Area Under Cultivation.

The distribution of areas under rubber in Malaya at the end of 1932 is shown in the following table —

TABLE III.

State or Territory.	Estates of 100 acres and over.			Estates under 100 acres.	Total Planted.
	Tappable Acres.	Immature Acres.	Total Acres.	Total Acres.	Area Acres.
Perak ...	250,953	23,504	274,457	251,202	525,659
Selangor ...	308,379	33,758	342,137	155,125	497,262
Negri Sembilan ...	228,541	45,565	274,106	81,299	355,405
Pahang ...	38,141	21,643	59,784	75,973	135,757
Total F.M.S. ...	826,014	124,478	950,484	563,599	1,514,083
Malacca ...	111,780	8,426	120,206	74,912	195,118
Province Wellesley ...	44,734	6,162	50,896	19,826	70,722
Dindings ...	6,969	956	7,925	7,667	15,592
Penang ...	1,635	186	1,821	11,212	13,033
Singapore ...	28,269	2,392	30,661	12,781	43,442
Total S.S. ...	193,387	18,122	211,509	126,398	337,907
Johore * ...	313,385	145,757	459,142	341,613	800,755
Kedah * ...	—	—	194,708	106,460	301,168
Perlis * ...	—	—	2,274	4,926	7,200
Kelantan * ...	—	—	33,998	58,789	92,787
Trengganu * ...	—	—	10,000	20,000	30,000
Total U.M.S. * ...			700,122	531,788	1,231,910
Total Malaya † ...			1,862,115	1,221,785	3,083,900

* 1931 records. (The figures for 1932 are not yet available, but are not expected to be markedly different).

† (U.M.S. figures for 1931 are included in this total).

It will be seen from the foregoing that the total estimated area under rubber in Malaya at the end of 1932 was 3,083,900 acres; of this total area 1,862,115 acres are estimated to be in production on estates of 100 acres and over.

Production of Rubber in 1932.

The production of rubber in Malaya during the year 1932 was 417,137 tons of which 240,107 tons was derived from estates of 100 acres and over and 177,030 tons from holdings of less than 100 acres each. In 1931, the production was 434,857 tons of which 239,435 tons were from estates of 100 acres and over and 195,422 tons the production of holdings less than 100 acres.

Malayan production in 1932 is sub-divided as follows —

TABLE IV.

	Production of Estates 100 Acres and Over.	Production of Estates of Under 100 acres.
Federated Malay States ...	140,525 tons	93,371 tons
Straits Settlements ...	24,985 ,,	24,877 ,,
Unfederated Malay States ...	74,597 ,,	58,782 ,,
	240,107 ,,	177,030 ,,

The production of rubber from estates was almost identical for the years 1931 and 1932, while the production of rubber from estates of less than 100 acres each (small holdings, native owned) showed a decline in 1932 of 18,392 tons as compared with the previous year, a drop of 9.2 per cent., while total Malayan production shows a decline of 4.1 per cent. as compared with 1931.

The net exports of rubber in tons from Malaya, Netherlands India and Ceylon for the past four years were as follows —

TABLE V.

	Malaya.		Netherlands India.*		Ceylon.§
	Rubber.	Latex.	Rubber.	Latex.	Rubber including dry weight equivalent of latex.
	Tons	Gallons	Tons	Gallons	Tons
1929	415,608	1,709,529	254,816	2,455,990	80,639
1930	434,638†	815,486	234,223	4,879,350	76,315
1931	412,265	741,363	257,273	6,657,840	61,609
1932	401,530	1,757,002	211,241	6,174,000	49,080

Local consumption of rubber amounted to 2,395 tons in 1932, as compared with 1,521 tons in 1931.

Total stocks of rubber in Malaya at the end of 1932 were—at Ports 6,058 tons, dealers 49,189 tons, on estates 21,777 tons, a total of 77,024 tons, as compared with 96,677 tons at the end of 1931.

The area of new plantings is estimated to be as follows—

Federated Malay States	...	3,496 acres
Straits Settlements	...	144 „
Unfederated Malay States	...	— „ ‡

In accordance with the decision reached in 1930 no fresh alienations of land for rubber planting have been made during the year, and consequently any additional areas planted have been on lands already alienated.

During the year the low price of rubber gave rise to a general demand from owners of Malayan Rubber properties that a reduction should be made in the quit rents charged by Government in respect of lands alienated for cultivation of rubber. This demand was acceded to and on July 30th, at the opening of the Malayan Agricultural and Industrial Exhibition, His Excellency the High Commissioner announced the decision of the Federated Malay States Government to waive all current rents due on lands cultivated under rubber in excess of $2 an acre. Similar decisions were made by the Government of the Straits Settlements and the Government of Johore, the condition of the waivers being that they applied to rents for the current year 1932 only (not to any arrears carried over from previous years) and to rents actually paid during 1932.

* As quoted in "Maandelijksche Rubber—Statistieken van Ned. Ooost Indie" No. 61, 1930, No. 74, 1931, No. 86, 1932.

§ As quoted in 'Supplement to the "World's Rubber Position" January, 1933, published by W. H. Rickinson and Son, January, 1933. Separate figures for latex are not available.

† In the figure shown in this report for the preceding year no allowance had been made for wet weight of imports from Netherlands India. Correction has been made in the figure now shown.

‡ Not yet available.

Rubber Areas Out of Tapping.

The continued low price of rubber has been the cause of certain estates entirely ceasing to tap their trees, and for others to cease tapping certain areas—presumably the less productive areas.

On the other hand on many estates it is considered more economical to tap than not to tap as the loss occasioned in this way is not infrequently less than the cost of putting the estate on to a care and maintenance basis; the crux of the matter no doubt being the yield experienced.

There has been some slight tendency towards the abandonment of rubber properties and a number have been sold on account of failure to pay quit rent, the majority have, however, been bought up by other properties, and the general tendency throughout the industry has been, so far as possible, to maintain properties in a workable condition in the hope of eventual recovery.

The following is a comparison of the area out of tapping in Malaya at the end of December 1931 and December 1932 —

TABLE VI.

	Estates which have entirely ceased tapping.		Estates which have ceased tapping part of area.			
	Acreage out of tapping.	Percentage of tappable Rubber out of tapping: to tappable Rubber.	Acreage out of tapping.	Percentage of tappable Rubber out of tapping.	Total area of tapping.	Percentage of tappable Rubber out of tapping.
December 1931	101,879	7.2	184,759	13.0	286,628	20.1
December 1932	141,448	9.9	173,377	12.2	314,825	22.1

In the latter part of the year, attempts were made to estimate the amount of rubber on holdings of under 100 acres in the Federated Malay States which were out of tapping. The result showed that of an estimated total of 510,000 acres of tappable rubber on small holdings in the Federated Malay States approximately 79,000 acres, or 15.5 per cent., were out of tapping.

When rubber prices reached their highest in August/September, there was a corresponding increase in the area tapped, but minor fluctuations in price caused no apparent corresponding variation in production.

Conditions on Estates.

The depression in the industry continued with increased severity throughout the year, and production has only been maintained at all by the exercise of the most rigid economy. Comparatively few estates have been able to carry on without actual financial loss, and in the rare cases in which it has been possible to make both ends meet the result has only been achieved when conditions in respect of yields are particularly favourable and by dint of sacrifice which must tell on the well-being of the industry and those connected with it. Remarkably low costs of production have been reached, in certain cases the minimum being as low as from 4—5 cents per lb. f.o.b.; but these must be regarded as the direct result of economies which are outside the range of practical politics under less stringent conditions. Nothing but very urgent upkeep services have as a rule been carried out, and great reductions have taken place in estate labour forces. During the year the Labour Department repatriated 56,471 Indian labourers and their dependents, while the importation of labour from India for estate requirements practically ceased.

All of these circumstances have combined to create a set of conditions which must be regarded as unstable.

It is, however, certain that the extremely stringent conditions which have prevailed during the past two years have opened up possibilities for production at costs which were undreamt of four years ago.

Under these conditions it is not surprising that progress is most directions connected with the agricultural side of the industry has been greatly retarded. Attention, for the most part has been concentrated on the possibilities of decreasing the cost of production by modifications of tapping systems, by the introduction of factory improvements and on the possibilities of increased consumption of the raw material.

On certain of the larger properties attention has continued to be paid to budgrafting and rejuvenation questions, the view being held that in the future those properties which have succeeded in raising their returns by the establishment of high yielding planting material are the most likely to survive.

A considerable amount of light has, in previous years, been thrown on the question of manuring rubber by experiments carried out in Malaya and in the Netherlands East Indies, but during the past year the low price of raw rubber has rendered the commercial application of fertilisers to rubber an uneconomic proposition.

During the year fertiliser trials have been continued on the Rubber Research Institute Experiment Station and on certain estates.

Some attention has been direced to the manuring of nurseries and, it is thought that this may be serviceable especially on poor soils, while young rubber manured in this way could be brought to bearing earlier. As a general conclusion the paramount importance of the nitrogen question has been emphasised and the view has been expressed that deficiency in this regard in the past has been the cause of many of the troubles experienced.

The practice of growing cover crops for the conservation of soil as well as the encouragement of growth of suitable natural covers is receiving considerable attention.

Experiments at the Rubber Research Experiment Station have shown that while leguminous covers definitely retard the growth of rubber during the early stages, the trees under such covers are now gradually catching up in growth. At a later stage, owing to soil deterioration on the clean-weeded areas, it is probable that the growth of the rubber trees will, on the cover crop areas, eventually surpass that of the trees on the clean-weeded areas.

The application of the so-called Forestry methods to rubber cultivation has been prominent during the year and there has been a good deal of discussion of the question in planting circles.

The subject was reviewed briefly in my last report but it cannot be said that a great deal has been added to knowledge of the question since then, save that it is becoming recognised that the extension of the principle involved of allowing natural growth to arise in rubber plantations may very easily be overdone.

The effect of allowing heavy secondary growth to arise has also been shown to create conditions favourable to the spread of certain diseases, particularly Mouldy Rot.

At the Rubber Research Institute Experiment Station, experiments have been in progress for some years past in which young rubber has been allowed to grow up in secondary jungle and under these conditions a definite retardation of growth has been shown to occur.

Work on budgrafting has continued to progress, although more slowly than hitherto, while systematic investigations in this repect have been continued at the Rubber Research Institute Experiment Station. A total of approximately 190 new clones have now been established at the Rubber Research Institute Experiment Station from high yielding Malayan mother trees selected on various estates.

It is estimated that at the end of 1932 there was a total area of approximately 95,831 acres of budded rubber in the Federated Malay States and Straits Settlements only, the figures for the Unfederated Malay States are not yet available.

Importations of budwood and superior planting material from the Netherlands East Indies and from other sources during the year were as follows —

Budwood	...	277 metres
Stumps	...	320 ,,
Selected seed	...	Nil.

These figures show a further very great decrease as compared with importations in previous years, attributable partly to the greatly increased popularity of budwood from proved Malayan clones or from known material raised locally in nurseries.

Information has continued to be accumulated regarding yields from various standard clones both of Malayan and Dutch origin planted under estate and experimental conditions. Certain clones have now demonstrated their ability to give yields of the order which were anticipated over appreciable areas, and the possibility of increasing yields of rubber by planting high yielding strains must now be regarded as having been removed from the realm of controversy.

Some attention has been paid during the year to the possibilities inherent in the budding of stumps of some size in the field, while investigations have also been made on the possibilities of test tapping of seedlings in nurseries with a view to ascertaining the probable future yields. A certain amount of work has been performed on bark renewal in certain selected clones and it has been found that in most respects results are satisfactory.

Increased attention has been paid to new systems of tapping with the object primarily of economising labour and therefore tapping costs. The so-called Sunderland system which originated in Ceylon is being tried out on a number of estates and the results of trials regularly examined by the Rubber Research Institute. It is contemplated to initiate further tapping experiments on mature rubber under the direct control of the Rubber Research Institute.

This work links up with plans for the study of the physiology of latex production, of which there is need if the question of extending the uses and and application of rubber in industry is to be followed up successfully.

Work by the Rubber Research Institute on the artificial pollination of rubber has ceased for the time being although it is still being continued on at least one estate; a collection of material derived from work of this type has been established on the Institute's Experiment Station and this will be available for use in future years.

In relation to disease questions, considerable additions to knowledge have been made during the year regarding the incidence of the two principal root diseases of the rubber tree, *Fomes lignosus* and *Ganoderma pseudoferreum*. It is considered that, under uncontrolled conditions, these diseases probably constitute an important limiting factor to the life of rubber plantations, at any rate when they are first planted on newly cleared land. Latterly methods of treatment have been studied which it is hoped may lead to the possibility of eradicating these diseases if control operations are carried out at an early stage in the life of the plantation.

Conditions considered favourable to the outbreak of mildew disease of the leaf caused by the fungus *Oidium Heveæ* were not recorded during the year so that it was not possible to carry out systematic experiments on dusting with sulphur for the control of the disease.

During the later part of the year, in certain quarters, attention was directed to the possibility that the disease might be more widespread than has hitherto been recognised and at the end of the year this assertion was being investigated.

Mouldy Rot disease has continued to occur throughout Malaya, particularly during the wet season. The position in relation to the control of this malady is rendered particularly difficult on small properties owing to the low price of rubber which precludes small holders applying remedial methods. On estates, remedial measures have continued to be applied but the possibility of infection from adjacent small holdings has proved a constant source of anxiety. There appears to be some evidence that strains of the disease possessing augmented virulence may be making their appearance.

Under the arrangements approved during the preceding year a number of new proprietary fungicides for the treatment of Mouldy Rot have been investigated by the Pathology Division of the Rubber Research Institute, with a view to their inclusion in the white list of fungicides approved for the treatment of the disease, which is maintained and published by the Department of Agriculture. As a result 4 preparations have been added to the list during 1932.

In relation to insect pests, further work on the treatment of white ants with Paris Green has been carried out, which demonstrates the utility of this material when applied under satisfactory supervision and with certain precautions. No satisfactory method of dealing with the cockchafer grub pest, reported on an estate in 1931, has yet been evolved. The pest has since been discovered on two areas on other estates.

In relation to the more economic production of rubber in the estate factory, considerable advances have been made by the installation of batteries of sheeting machines in column or line-ahead formation, the use of troughs and chutes to convey coagulum and the installation of coagulation tanks to produce a continuous sheet.

Batteries of six machines have been found to be capable of dealing with the output of estates of 5000—6000 acres.

On other estates it has been found possible to adapt and re-arrange existing machinery in order to effect improvements in output.

In must be realised, however, that on small estates, the economies effected may not warrant the installation of new machinery and that the full benefits are only derived when such machinery can be used for a large area by centralising the factories. It is visualised also that it may be possible to prepare a pale sheet rubber which can be used as a substitute for pale crepe thus eliminating heavy machinery except for the treatment of the 10—15 per cent. of lower grades.

A number of estates are now preparing air-dried sheet in place of smoked sheet. Considerable attention is being paid to more economic methods of drying and smoking, particularly in relation to better control of the supply of heat and the ventilation of drying and smoking rooms.

During the year, considerable interest has been taken in the export of latex and methods of concentration of latex for export in this form,

Until recently, latex concentrated in centrifugal machines and latex concentrated by evaporation in the presence of a stabiliser (Revertex) have been the only two types of such concentrates prepared in and exported from Malaya. Both of these processes are protected by patents.

The demand for both ordinary latex (dry rubber content 35—40 per cent.) and concentrated latex (dry rubber content 55—60 per cent.) is increasing, due both to the substitution of latex for raw rubber in certain articles already manufactured and also to the extending application of latex to new uses.

A publication on the preservation and shipment of latex has been issued by the Rubber Research Institute and much interest is being taken in the possibility of the increased production of latex.

Further investigations on the non-caoutchouc constituents of latex have been carried out by the Rubber Research Institute together with work on the effect which they exercise on the vulcanising and other properties of raw rubber, and attempts made to find a possible use and market for quebrachitol, considerable quantities of which have been isolated from latex serum.

Small Holdings.

The system of surveys and quarterly reports published in the *Malayan Agricultural Journal* on conditions on small holdings begun last year has been continued.

Data collected by the Statistical Division of the Department of Agriculture and the Department of Statistics, Federated Malay States and Straits Settlements, places the production of rubber on small holdings during the past three years at the following figures —

TABLE VII.

	1930	1931	1932
	Tons	Tons	Tons
Federated Malay States ...	110,206	105,378	93,371
Straits Settlements ...	38,770	25,346	24,877
Unfederated Malay States ...	66,113	63,698	58,782
	215,089	194,422	177,030

It will thus be seen that production on small holdings shows a diminution which amounts to 7.25 per cent as compared with 1931 and 17.7 per cent as compared with 1930.

Corresponding figures for the production of rubber from small holdings in the Netherlands East Indies are as follows —

1930	1931	1932
88,920	89,736	62,381

The investigation into the questions of tapping practice on small holdings, bark reserves and rate of bark removal and bark renewal are nearly completed and it is expected that the final analysis of figures will be completed in time for publication of the information obtained during the first half of 1933.

The figures obtained from lots of 100 consecutive trees on the 75 holdings show that the average monthly rate of bark consumption amounts to 1.64 inches of vertical bark on a quarter circumference tapping cut. The average amount of reserves of tappable bark, below a standard height of six feet from the ground, remaining per tree at the end of the period of observation, is shown to be 145.75 vertical inches of one quarter circumference in width, or a little more than half the surface of bark below six feet from the ground.

It will be seen then that the average amount of existing bark reserves will permit of a continuation of tapping work under the conditions obtaining during the period of observation, without making any allowance for the factor of bark renewal, for a period of seven years and five months.

Since the average age of the trees on the 75 holdings under observation is found to be very nearly 16 years and allowing for the trees having been brought into tapping at the age of 6 years, it will be seen that bark renewal has so far been at a sufficient rate to allow for 10 years of almost continual tapping.

The severity or otherwise of tapping varies in different localities and is influenced very largely by the extent to which the owner has other means of livelihood. Hence in the vicinity of padi areas heavy tapping is less common than in localities where large areas of small holdings exist with rubber as the sole crop. Furthermore, such of the small holding rubber in the vicinity of padi areas is periodically rested when padi cultivation operations are in progress.

Even under the very low prices ruling, severe tapping is confined to a restricted number of localities where owners are unusually badly circumstanced; generally speaking, methods of tapping on small holdings are far less ruthless than they were a decade ago.

As usual, the prices quoted by the very large number of local buyers for small-holders' rubber exhibit a very great range. The main factors concerned, apart from the quality of the rubber, are the extent to which transport facilities are developed and the degree of competition in respect of each buying centre.

As an example of the price range existing, the following quotations from various States and Settlements for small-holders' smoked sheet in Straits dollars and cents per picul are reproduced from the December reports of Agricultural

Officers—Kedah 8 to 10; Province Wellesley 6.70 to 10; Perak 6.50 to 9; Selangor 6 to 9.25; Negri Sembilan 7 to 9.25; Malacca 8 to 9; Pahang 6 to 9.20.

Reference to an earlier statement will indicate the position at the end of the year in the matter of areas out of tapping. There is a good deal of fluctuation in this respect, sometimes due to a change in price, but more largely influenced, in areas where padi is grown, by the claims this latter crop has on the owner. In respect of price influence, it may be recorded that the rise of price in August resulted in increased tapping in some parts, especially where rubber constituted almost the sole crop.

There has been no general tendency to replace rubber by another crop, but a number of instances exist where a small-holder has cut out a small percentage of his poorest rubber with the object of utilising the land for growing sufficient foodstuffs for his own needs. This applies more particularly to areas where other land is unobtainable for the purpose. Such old rubber land generally needs manure to enable it to grow foodstuffs and the Agricultural Department has rendered assistance by advice and demonstration in a certain number of instances where the land owner has experienced difficulties in the matter.

The area newly planted on small holdings during 1932 amounted to 1,875 acres in the Federated Malay States and 52 acres in the Straits Settlements.

General.

During the year much attention has been directed to the question of finding new and extended uses for rubber.

The Rubber Growers' Association, assisted by a grant of £100,000 spread over a period of ten years from the Federated Malay States Rubber Research and Propaganda Fund, has undertaken an extensive series of investigations in this respect.

The work in England carried out by the Research Staff stationed at the Imperial Institute has been continued; the cost of this, which was formerly borne entirely by Ceylon, has since the commencement of 1932 been divided between Ceylon and the Rubber Research Institute of Malaya. It aims at establishing a link between the planting interests concerned with the production of rubber in the East and the manufacturers at home.

Particular attention has been directed both in the East and in Europe to the possibilities inherent in rubber road making and paving materials.

Trial stretches of road treated with various form of rubber mix have been laid down in the East and also in Europe, while in England and in France several street areas paved with rubber blocks are under observation.

PROPAGATION OF TEA FROM ETIOLATED SHOOTS.

BY

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Senior Assistant Agriculturist

and

T. D. MARSH,

Assistant Agriculturist.

Introductory.

While on leave in England during 1932, one of the writers (J. N. M.) was given the opportunity by the Director of the Imperial Bureau of Fruit Production to examine the work conducted at the East Malling Research Station, Kent, with the vegetative propagation of various temperate fruits. The investigations at that station have been concerned primarily in the determination of methods of multiplying fruit tree root-stocks vegetatively in order to perpetuate races of known characteristics. The results obtained have been published in detail (1). It was evident to the observer that the methods employed might, with some modifications, be used in the tropics in the asexual propagation of a variety of hard-wooded plants. Steps were taken, therefore, during the latter part of 1932 to test these methods under Malayan conditions.

The following plants are now under experiment,—rambutan (*Nephelium lappaceum*), pulasan (*Nephelium mutabile*), lime (*Citrus medica* var. *acida*), citrus varieties, chiku (*Achras sapota*), rubber, tea, and coffee. Successful results have so far been obtained with tea, various citrus trees and pulasan. Since it has been demonstrated that tea shoots may be induced to root readily by this new method of propagation, it is proposed to publish the results to-date.

Methods of Vegetative Propagation.

There are a variety of methods employed in propagating plants vegetatively, namely hardwood and softwood stem cuttings, root cuttings, stools, layers, grafts and marcots. With regard to marcotting this method is commonly undertaken in Malaya in raising fruit trees of desirable quality and a marcot, which is known as a 'tut' to the Malay in this country, consists of 'ringing' a branch, covering up the ringed portion until adventitious roots appear, when the rooted branch is placed in a receptacle containing soil (2). From a practical standpoint, the method just described is unsuitable in the case of many plants including the tea bush, whilst poor results are obtained from cuttings.

Various systems of budding and grafting have been employed in Java (3). The usefulness of these methods of propagating tea is in the establishment of uniform areas for seed production and experimental purposes. Uniform stocks are, however, necessary since seedling stocks produce variations in the characters of the scions grafted upon them.

Etiolated Tea Shoot.

Showing root system above wire band,
six months from collar pruning.

Layering is successful, but is a slow and expensive method. It is stated to be most satisfactory with the 'China jat' type of bush and is extensively employed in Formosa in maintaining the special characteristics of oolong teas (4).

Basing the method of propagation on that undertaken with apple stocks at the East Malling Research Station, it has been found possible to cause shoots from collar-pruned tea bushes to produce a large number of roots in the short space of six months. The principle involved in propagation from stools is the production of a number of shoots from the pruned stump which under suitable conditions produce roots at their bases. The necessary conditions are obtained by mounding up the shoots with soil which causes the lower portions of the stems to become etiolated or blanched. To ensure rapid root formation the soil is then removed and a band of thin copper wire placed round the base of each shoot a short distance above the point where it emerges from the stump. The soil is then replaced when root formation occurs, presumably as a result of stimulated callus formation and a reduction of hard, fibrous tissue in the cortex of the shoot, as a result of etiolation.

It is recognised that modifications of the method employed may eventually be found advantageous in the propagation of tea. Further, it is appreciated that there are possible limitations to the practical application of asexual propagation of tea since it is generally stated that the development of a strong taproot is necessary with this crop. This may be obtainable only from seedling plants.

With regard to citrus it appears probable that the layering system, as undertaken at the East Malling Research Station with plum and cherry stocks, will be found of practical utility. Preliminary results at the Experimental Plantations at Kuala Lumpur and Serdang give promise of satisfactory results from this method. Success with citrus and Nephelium species has been reported from Ragoenan Experiment Station, Java (5). Satisfactory results have also been obtained in Java in propagating tea (6). In this method the plants required to be propagated are planted in rows obliquely at an angle of 35 degrees to the horizontal. When sufficiently established the young trees are laid and pegged down in a shallow trench several inches below ground level. As shoots appear from the main stem and lateral branches, an inch or so of fine soil is placed over the entire tree. The growing shoots have thus to ascend through the layer of soil. As growth proceeds, further soil is added, until a layer of earth 4 to 6 inches in depth covers the base of the shoots. The portion of the stem below the soil receives no light and becomes etiolated. This condition is favourable to rooting which occurs freely in the blanched portion of the stem of the shoot below the soil.

This method of propagation appears generally more suitable for use in temperate countries where the operation of pegging down decidious trees during

winter is a comparatively easy matter. The return of growth in spring results in the production of vigorous shoots which push readily through the soil. In the tropics where growth is more or less continuous it is a more difficult matter to induce free growth after the trees are covered with earth.

Propagation from Tea Stools.*

Twenty tea bushes planted as seedlings in the field in November, 1929, at the Government Plantation, Serdang, were collar pruned to the surface of the soil in October, 1932. Within a month's time a number of shoots made their appearance. The average number per bush was five although additional shoots appeared later. Surface soil was then drawn round each stool and the base of the shoots covered with earth to a depth of 4 to 6 inches. Early in January, 1933, the soil was removed from all the stools and a band of wire placed round the base of each vigorous shoot. By the middle of April, i.e. six months after the tea bushes were collar pruned, it was found that a large number of the shoots had produced strong roots. An average number of three rooted shoots were removed from each stool, and many others were found forming roots. These were transplanted into bamboo joints and suffered no ill effects from being severed from the parent bushes. Rainfall during the whole six months was fairly heavy there being only one dry spell of about two weeks in February. The illustration shows a typical shoot with its rooting system. It appears probable that, by selecting older tea bushes with a vigorous rooting system, a considerably larger number of shoots might be produced after collar pruning.

A further consideration is the question of starch reserves of the tea bushes to be collar pruned which undoubtedly is an important factor in the production of a number of vigorous shoots. A high starch reserve is obtained by ceasing to pluck the tea bush for two to three months before pruning.

Conclusions.

The etiolated shoot method of propagation affords opportunity for the rapid increase of desirable clones of hardwood plants. Preliminary work conducted by the Department of Agriculture has given promising results with tea, and a variety of economic plants are under experiment. Further work is necessary to determine whether such rooted tea shoots will prove as satisfactory as seedling plants in the field. The work conducted at the East Malling Research Station opens a wide field of possibilities in plant propagation which now remains to be applied under tropical conditions.

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*Since this paper was submitted for publication, a summarised translation of Wellensiek's paper in *De Bergcultures*, 1932, 6, pages 778—81 has become available. Similar results to those now published are recorded and the wire ring propagation method with tea in the Netherlands East Indies is shown to be very successful, thus confirming the results obtained under Malayan conditions.

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NOTE ON THE FLOWERING OF THE NIPA PALM UNDER CULTIVATION.

BY

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Economic Botanist.

So little was known of the flowering characteristics of the nipa palm (*Nipa fruticans*) under cultivation or under natural conditions that an attempt was made to collect some information in 1931.

Records of the sequence and duration of the various stages in the opening of the flowers under natural conditions were made at Titi Serong Padi Experiment Station, but the observations were unsatisfactory since the palms under scrutiny had been subjected to heavy periodical prunings for the purpose of collecting leaves from which to make "attap" so that flowering was obviously weakened and retarded. Nevertheless, those observations showed that self-pollination occurred naturally but that cross-pollination, either by wind or through the agency of insects, was the more common mode of fertilization. Large ants ('keranga',-*Occophylla smaragdinia*) were the only obvious insects present in numbers sufficient to effect the pollination of the opening female flowers but possibly night flying insects were also plentiful though no record of their presence was made.

Unfortunately the particular palms used for those observations had to be destroyed before further records could be collected and a second series of observations, which was started near Klang, was abandoned because the palms were continually being defoliated by "attap" weavers. Subsequently the study of the flowering features of the palm, especially with a view to ascertaining definitely the possible advantages of artificial pollination under estate conditions as affecting the yields of juice, became an important problem. The General Manager of Nipa Distilleries of Malaya Ltd., was approached and kindly agreed to permit his staff to co-operate in the collection of the desired information on that Company's estate in Selangor. A list was made of suggested observations aiming at the attainment of information to define (1) the agency or agencies of pollination, (2) whether self-pollination was possible, (3) whether cross-pollination was normal and (4) whether artificial pollination was practicable.

Suitable isolation cages for the bagging of flowers were supplied to the estate and observations were inaugurated and carefully carried out by the estate staff on 24 palms, half of the number being situated on 'lenggaddai' (*Bruguiera parviflora*) land and half on 'piai' (*Acrostichum aureum*) land. The palms were approximately 10 years planted and were representative of the different

conditions, as regards soil and water supply, found on the estate. The observations extended over a period of 6 months and can be summarised as follows :—

(1). The flowering sheath from its first appearance, takes 4 — 6 weeks to reach a length of approximately one foot.

(2). From this stage to the opening of the male flowers, there is a variation from 14 to 27 days with an average of 21 days.

(3). The duration of the male phase of flowering varies from 4 to 10 days according to weather conditions. In hot dry weather, this phase lasts for 7 to 10 days while in cool, moist weather all the male flowers opened in 4 to 5 days.

(4). The female flowers remain receptive for 7 — 8 days and invariably commence to open 1—2 days before the male phase begins.

(5). The fruit is ready for the "Gonchang" (binding and beating to accelerate juice exudation) period approximately four months after the beginning of the female phase.

(6). The total time required for the maturation of ripe fruits (untapped) from the beginning of the male phase is approximately 6 months.

(7). There was no apparent difference in the various phases of flowering whether the palms were grown on 'lenggaddi' or on 'piai' land.

(8). Artificial pollination, while not strictly necessary, appears to be beneficial in that artificially pollinated heads are more uniform in size and larger than those derived by natural means of pollination. Further, fewer heads dry up or fail to come to maturity in the case of artificially pollinated heads.

(9). Artificial pollination is practicable, and was established in practice on the estate.

(10). No particular insects were observed to have effected pollination and it was taken for granted that wind was the chief pollinating agent.

This completes the summary of the observations then made but it should be mentioned that in connection with the last point, (pollination), numerous insects have been recorded as found in the vicinity of nipa palms by Mr. G. H. Corbett, Government Entomologist, S.S. and F.M.S. though no reference to them as pollinating agents has been made.

In 1931 Corbett* reported the presence of an anthomyiid fly (*Phaonia Corbetti*) as a serious pest of the male flowers of this palm and it is possible but unlikely that this fly may play some part in pollination.

This brief summary is intended to preserve a record of the observations which were compiled, and thanks are due to the General Manager of Nipa Distilleries of Malaya Ltd., for his consent to the publication of the information obtained.

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* *Malayan Agricultural Journal,* Vol. 19, 1931, page 37.

Reviews.

Lightning Storms and their Significance in Relation to Diseases of (1) *Cocos nucifera* and (2) *Hevea Brasiliensis*.

By A. Sharples.

(From The Annals of Applied Biology Vol. XX. No. 1. February 1933.)

The Coconut palm in Malaya has never been associated with the attack of virulent parasitic fungi capable in themselves of causing the death of a palm. The literature on diseases of Coconut palms in other tropical countries is fairly extensive, and a study of such literature will reveal that there is one form of disease which is fatal and which is considered to be due to the direct attack of micro-organisms, viz :—bud-rot.

In the article under Review, the writer—Mr. A. Sharples, formerly Government Mycologist in the Department of Agriculture S.S. and F.M.S.—gives a clear exposition of the work on Bud-rot of Coconut and other palms in the countries where this disease has been studied, and it is explained how the term Bud-rot has been rather loosely applied to various maladies of the Coconut palm which frequently end fatally.

Workers in other countries have established the connection of the fungus *Phytophthora palmivora* Butl. with an epidemic disease of coconut palms in which the heart leaves, or central spike, turn brown initially and then die and fall over, while the remaining leaves remain green and healthy for a time. The palms, so affected, do not recover, because all the meristematic tissue, concentrated in the bud, presumably is killed and further growth does not take place.

Symptoms of "bud-rot" in coconut palms in Malaya differ from those described from other countries, where the fungus Phytophthora is connected with the disease, in that the central leaves and spike are not as a rule noticeably affected until the outside, older leaves have died. It is therefore not strictly correct to term the local malady "bud-rot", and the writer of the article under review, presents evidence which indicates that normally, in Malaya, the primary initiating cause of "bud-rot" of the coconut palm is injury by lightning. There is no evidence in Malaya up to date to show that a *Phytophthora* sp. is associated with the problem as a causal agent.

It is interesting to record that a form of true bud-rot of the oil palm occurs in Malaya, but here again the disease differs from true bud-rot of the coconut palm in that affected palms, although showing the typical symptoms of collapsed central leaves and foul smelling bud tissue, normally recover and produce a new crown of central leaves. In the Reviewer's experience cases of bud-rot of oil palms are frequently associated with injury to the bud tissue by insect or by mechanical injury. In this connection it may be remarked that symptoms resembling bud-rot were produced artificially in Coconut palms in Malaya

following mechanical injury to the palms in the neighbourhood of the bud tissue (Sharples A. and Lambourne J., Annals of Botany XXXVI.), but no definitely parasitic fungus was found to be associated with the resulting decay.

The article describes the typical forms of injury to the coconut palm as a result of lightning strike. It is stated that the areas affected can be divided into

(*a*) Small areas, of common occurrence.

(*b*) Large areas, of rare occurrence.

"The typical cases, locally known as bud-rot due to lightning strike, show "a group of 10—12 trees, of which one, two or three central trees die rapidly; "on examination the bud tissues are found to be in a badly decayed condition. "The surrounding trees show disease symptoms of varying intensity, *e.g.* stem "bleeding, broken and hanging outside leaves, with the central leaves and spike "still standing erect. When left untreated some of the slightly affected trees "gradually grow worse and finally succumb.

"The leaf symptoms on the slightly affected trees can be conveniently "described here. The broken leaves are found in some cases with the break "taking place about 2 ft. away from the distal extremity, so that the tip of the "leaf hangs down. Such damaged leaves are termed "tipped". Others show "the break taking place about the point where the basal leaf pinnae join the "petiole, about 3—5 ft. from the stem, and the whole of the leaf stalk carrying "the leaf pinnae hangs down. "Broken" leaves is a convenient term for such "leaves in contradistinction to "tipped". Leaves breaking away from the stem "at the base but remaining attached and hanging against the stem are termed "hanging" leaves.

"(*b*) Large areas affected by lightning. The large areas of affected palms, "groups in which over 100 diseased palms may be found, are of very rare "occurrence. The first was examined in 1923, when 80—100 palms were found "showing symptoms exactly similar to affected palms in the small patches. On "the same estate in 1926 a larger area, showing between 200 and 300 affected "trees, was found. This incident caused much concern, because of the possibility "that the area affected in 1926 might be considered a reinfection from the 1923 "area.

"In dealing with this outbreak great precautions were observed to prevent "spread as a result of diseaesd tissues being transported down the drains. The "possibility of a severe root infection could not be ignored, and the usual "isolation methods were recommended. The area was trenched off and no fresh "cases of diseased trees have yet been reported outside the isolated area."

In 1928 a questionnaire asking for information in connection with lightning storms was sent to a number of estates and from reports received, and from examinations made, it was concluded that lightning is the cause of death of palms in cases where groups of 6—12 palms were affected, and that there is no reason to fear the spread of disease owing to the presence of a parasitic organism.

The article presents a theory of lightning discharge and its significance in disease problems on Malayan coconut plantations, which might with advantage be quoted in full.

" As mentioned above, the symptoms shown by the affected palms and the " sequence of events so far met with in the larger areas are exactly similar to " those found in the smaller areas where the evidence for regarding lightning " as the primary initiating cause is so strong. Lacking a satisfactory explanation " the only cause for congratulation was that the large affected areas occur only " at rare intervals. Three have been studied up to date, one in 1923, one in " 1926, both of which occurred on the same estate, and one in 1928. In 1929 " the Twentieth Kelvin Lecture was delivered before the Institute of Electrical " Engineers by Dr. G. C. Simpson, C.B., F.R.S., and his subject was "Lightning". " The lecture had many points of interest in view of the the position in Malaya " with regard to lightning strike and bud-rot of palms.

" Dr. Simpson in his exposition distinguishes three types of discharge :

" (1) The discharge within the cloud.

" (2) The discharge to the ground from a positive cloud.

" (3) The discharge to the ground from a negative cloud.

" He states that the two latter are of most importance to the electrical " engineer, for it is these which strike buildings and overhead wires and do " structural damage.

" The characteristics of the two types of discharge to the ground are very " different. The discharge from a positive cloud starts high up in the atmosphere " and branches out on its way to earth. An earth-connected object may there- " fore be struck either by the main "trunk" or by one of the "branches". On " the other hand, a discharge to a negative cloud starts on an earth-connected " object which takes the whole discharge. Thus the chances of being struck are " much greater with a positive discharge than with a negative discharge.

" The theory leads to the conclusion that discharges from positively " charged clouds would be frequent but weak, while discharges from negatively " charged clouds would be infrequent but very strong. Dr. Simpson stated a " further conclusion, *i.e.* that there are at least four times as many discharges " between positively charged clouds and the ground as between negatively " charged clouds and the ground, and that there are good reasons for believing " that the ratio is nearer 10 - 1 than 4 - 1.

" Applying these conclusions broadly in relation to lightning strike on " coconut palms two important points are immediately obvious. Discharges " from positively charged clouds will be frequent but weak. These frequent " but weak discharges can be considered as responsible for the numerous small " groups of palms killed during practically every month of the year; in connec- " tion with these conclusive evidence has been obtained of the direct connection " between the typical symptoms and lightning.

" Discharges from negatively charged clouds will be infrequent but strong. " These infrequent but strong discharges allow a convenient and fitting explana-

"tion for the occurrence of occasional large areas of coconut palms being killed "out, although there is no direct evidence of the connection between the two. "The symptoms shown by the affected palms in the small and large areas are "so exactly alike that only one conclusion can be drawn and that is that the "causal agent is the same in both cases. Until the appearance of Dr. Simpson's "paper caution was necessary in the absence of any direct evidence or fitting "explanation, but now that the phenomena experienced on coconut plantations "can be fittingly connected up with physical phenomena there seems no reason "to doubt the adequacy of the explanation. Many diseased areas have been "investigated personally, and the general trend of events is found to be similar "in all.

" The conclusion can be stated with absolute definiteness that lightning is of "primary importance in the causation of disease on plantations of *Cocos nucifera* "in Malaya. This statement gains added point from the fact that not only is "lightning the source to which false bud-rot has been traced but definite evidence "has been obtained to show that it must be considered to be the initiating cause "of many cases of stem bleeding and root disease of coconut palms. The "symptoms of these diseases have been found to be purely secondary, appearing "in trees lightly but not visibly affected by lightning on some previous occasion".

With regard to the effect of lightning on the rubber tree the writer groups his observations under two headings

(*a*) Lightning effects and "die-back" usually found in young trees.

(*a*) Lightning effects and "claret-coloured bark canker at the collar" found on trees from 4 to 20 years of age.

The record of the association of a fungus—*Pythium* sp.—closely related to the fungus Phytophthora—in a disease of the rubber tree initiated by lightning strike, is of particular interest, especially in view of the fact that the fungus Phytophthora has not so far been found associated with lightning strike in local coconut palms.

The writer suggests that it is probable that the reason why a species of Phytophthora has not been obtained from bud-rot of palms in Malaya is that no strain of Phytophthora, capable of attacking palms, is present in Malaya, but, on acount of the known possibilities in Phytophthora of producing variants from a parent type by dissociation, it is considered not improbable that, in the future, a *Phytophthora* sp. may be found as a causal agent in connection with bud-rot of palms in Malaya.

(A. T.)

Annual Report Tea Research Institute of Ceylon 1932

Bulletin No 10.

The Annual Report for the year 1932 contains under its various headings matters of great importance to all who are interested in the Tea Industry, particularly as at the present time, tea, like all other primary products is suffering from the effects of the prevailing world depression in commodity prices.

It is of interest to note that advisory work has expanded very considerably, which is conclusive evidence that planters are appreciative of the benefits gained from the work of the Scientific Staff. The greatest interest shewn related to methods of manufacture, which suggests that good use is being made of the Institute, with the definite object of improving the quality of the tea marketed.

The portion the report dealing with withering will be of particular concern to tea planters, as it is now realized that withering is of very considerable importance in deciding the final quality of tea. Results from experiments conducted during the year under review, proved that the period of withering has a marked effect on the tea made; withering for 14 - 20 hours producing a different grade of tea compared with that made by lengthening the period of wither to 36 - 40 hours, in the former case more colour being obtained in the liquors, and pungency, quality and flavour being lost in the latter. The full results of experiments carried out are shewn in Table V, (Effect of Withering on the Tea Made); whilst in Table VI, the effect of degree of wither can be seen. The value of these experiments cannot be over emphasized and they should prove of real interest to all tea growers.

Further it is shewn that micro-organisms play an important part in the manufacture of good quality tea. Experiments indicated that these are in the main detrimental, and absolute cleanliness during manufacture is considered essential in order to avoid the risk of taints developing in the tea, through contact with stale leaf from a previous batch. This appears to dispose of the former theory that fermentation was largely dependent on the presence of micro-organisms on the fermenting floors.

In the Field Branch various experiments have been carried out, several with a view to further economy in costs of production and others to increase knowledge of the effect of pruning in relation to yields.

During a course of manurial experiments it has been shewn that provided green manuring is carried out to a sufficient degree, good results should be obtained from the use of inorganic artificials. This finding, if substantiated, is of importance in view of the bias against these manures in the past. Special pruning mixtures have been used for many years, but this practice is no longer advocated, it is now being advised that a mixed manure be employed throughout the pruning cycle. With a view to finding the most satisfactory green manures and cover crops the Agricultural Chemist conducted field trials, this work being considered of sufficient importance to warrant continuance in 1933; the results of these trials should prove of value to the industry.

On small-holdings an endeavour was made to direct the owners along established lines in the cultivation of their lands. Demonstrations were arranged in the villages and great interest was evinced by the villagers, good progress in all works being reported by the Small-Holding Officer.

The Balance Sheet of the Institute suggests that the ultimate development of its programme of work, depends largely on market conditions for tea during the next few years, as the imposition of any form of restriction will certainly reduce its future income.

W. G. H.

RUBBER GROWERS ASSOCIATION.

Twenty-fourth Report of the Council.

The report of the council of the Rubber Growers Association which was presented at the ordinary general meeting in London on April 26th 1933, contains much information of interest especially in the reports of the various committees.

The section of the report dealing with the work of the "Technical Research and Development of New Uses Committee" records progress in relation to the use of rubber in linoleum, textile finishes, paints and highway surface construction, and mention is made of investigations carried out on deodorisation of vulcanised rubber and its use in hose and rubber lined containers, rubber insulation etc. in the manufacture and handling of food stuffs and in connection with ebonite partitions. An investigation into the use of rubber as a jointing material and oil and petrol resistent rubber is also noted. It is stated that the literary portion of a handbook for the use of engineers, chemists and physicists, containing physical and technical data likely to be needed in constructural design, was expected to completed by the end of June 1933.

With a view to widening the use of rubber in (for example) the building, decorating, upholstery, chemical trades etc., research work on "modified rubbers" has been commenced.

The Committee communicated with a number of Universities and Colleges calling attention to rubber as a suitable subject for research, particularly for postgraduate students.

The Committee decided to enlist the co-operation of the Rubber Research Organisations in Malaya and Ceylon, the Departments of Agriculture, in these countries, the Proef Stations in the Netherlands East Indies, and the International Rubber Association (Holland), in further research on latex, particularly

with regard to bulking latex on estates, suitable containers, standard qualities for export, improved processes of preparation on estates, as well as fundamental research on the physical and chemical properties of latex in the natural state, and also when subjected to varying temperatures, pressures and chemical reagents.

In connection with the preceeding enquiry the Committee suggested that co-operation in all technical research investigations could be best effected by the establishment of an International Committee in Europe in close contact with a corresponding organisation in the East.

The Report of the Propaganda Committee gives an account of the Exhibitions at which displays were made, and of publicity given to the uses of rubber in rubber-flooring, upholstery, automobiles, railway rolling stock, textiles etc., both at Exhibitions and through the medium of descriptive pamphlets and other publications.

(A. T.)

Stock Farming in the Tropics.

Comments on the Report on Cattle Breeding in Jamaica and Trinidad, by John Hammond, School of Agriculture, Cambrigde. Empire Marketing Board 58. August 1932. Printed and published by His Majesty's Stationery Office, London. 66 pages and 65 illustrations, price 1/- nett.

This publication is particularly interesting as research on stock raising is being carried out on many similar lines in these countries as at the Government Stock Farm, Serdang, and the results obtained so far are in many respects similar. A few comments on the work and results at Serdang are incorporated in these notes.

The bulletin covers a general survey of cattle raising in Jamaica and Trinidad. Comments are made on the suitability or otherwise of various European breeds in these environments and includes the results to-date of cross-breeding experiments with Indian and West Indies mature cattle.

The policy adopted at the Government Stock Farm, Trinidad, is practically identical to that at Serdang. The present size of the Dairy Farm at Serdang, with the limited number of cattle available for experiments in breeding, only permits of the production of a very few specimens of each cross, making it difficult to judge the merits of each cross owing to individual variation.

The practice of infecting cattle, newly imported into Jamaica, with tick fever (piroplasmosis), and their subsequent treatment with trypan blue in endeavours to immunise them against further attacks, is illuminating. In this respect a heavy mortality has occurred in Malaya in imported grade cows in milk of European breeds, mostly from Australia.

It has been found that actual periodic dipping of animals, to prevent attacks of tick fever, is essential in Jamaica, whereas in Trinidad, as at Serdang, spraying has been found to be efficacious.

Of the Indian breeds of cattle observed in the West Indies, the Montgomery breed is considered by the writer to be the best for milk and meat qualities. The Mysore is probably the most suitable for draught, the Hissar or Nellore breed is considered to carry the combined qualities of work and milk production.

It is inferred from the above that these breeds are considered the most suitable for infusing their particular good qualities into their offspring when used for cross-breeding with local heterogeneous cattle, especially so when hardiness, disease resistance, and the ability to thrive under adverse tropical conditions are the characters desired, and the aim is improvement more or less by selection without the introduction of European blood.

Some authorities criticise the practice of cross-breeding European stock and "Zebu", on the grounds that the characters are so diverse that segregation takes place and results in the breeding often of nondescript degenerate animals having little utilitarian merit in any category. The writer contends that the characters of constitution and milk yield are multiple ones, in contrast to the fancy points such as colour, horns, etc. and there appears to be a useful blending instead of the possible splitting up as suggested by the Mendelian theory into the dominant and recessive characters. Apparently the slow rate of breeding of Indian cattle in the West Indies is an important economic factor. The writer of the article refers in particular to cows sired by a Nellore bull.

At Serdang the same difficulty has occurred with the Sahiwal (or Montgomery) cows and it is apparently due to the inherent characteristics of these cattle. It has been observed at Serdang that cows do not show signs of being in oestrum until several months after calving, and, should an isolated one become incalf earlier than usual with these breeds, her milk yield will fall off and she will have a low total yield during that particular lactation; in other words cows will not continue to milk after becoming incalf.

The general impression formed of the means of improving the stock of Jamaica is by an infusion of European blood and the use of cross-bred bulls is recommended. At the same time it is stated that there appears to be no reason, except the time factor, why an upgrading of native cattle could not be carried out to produce good results.

In Trinidad, of the European breeds, Friesians have given the best results when used for cross-breeding to infuse desirable characteristics into the offspring of the heterogeneous cattle of the Island, and the policy now adopted at the Government Stock Farm is to use for this purpose bulls of this bred only.

The experiments that have been conducted to ascertain the best admixture of Montgomery and Friesian blood for milk production combined with tropical disease resistance, and the ability to thrive and milk well in the tropics indicates that $\frac{1}{4}$ to $\frac{1}{8}$ Montgomery and $\frac{3}{4}$ to $\frac{7}{8}$ Friesian gives best results, this follows the previous results of published work at Pusa, India. It is considered that cattle having the above admixture of European and Indian blood would make excellent foundation stock for the establishment of a new breed.

The necessity for adequate feeding of stock is emphasised and it is considered that some of the so-called degenerate changes taking place may be in part due to the inadequate feeding of young animals. This applies in particular to European and European cross-bred stock in the tropics. The writer stresses the desirability of adding proteins to the ordinary grazing diet if well proportioned animals are to be grown. It is also considered that delaying the time of the calving of heifers of the larger European breeds permits them to develop into better animals.

The writer appears optimistic in suggesting that one prime objective should be the selection of Zebu bulls bred from cows that will let down their milk without the calf being present; the objective is an excellent one but the experience at Serdang is that the maternal instinct is so strong in these animals that it is essential with all our pure-bred Indian cows to have the calf present, at least at the commencement of milking, otherwise the cow will go dry in a very short time despite the efforts of the best milkers.

The published results in this bulletin show that a certain amount of success has been obtained at Trinidad in this respect. It is suggested that this characteristic may be an inherited one in Trinidad cows and is the result of an earlier infusion of European blood, in view of the statements that frequent importations of European stock of many breeds have been made for many decades past.

For successful dairying it is essential that cows shall permit of their calf being weaned at birth, and this is a strong argument in favour of the use of European breeds for the upgrading of tropical stock as milkers and to introduce docility as characterised in this form.

(T. D. M.)

Abstract.

FOURTEENTH REPORT ON NATIVE CULTIVATION.

First Quarter 1933.

Prepared by the Bureau of Agricultural Economics of the Division of Agriculture of the Netherland Indian Department of Agriculture Industry and Commerce, at Buitenzorg, Java.

General review.

In the previous report concerning the native rubber cultivation it was pointed out in passing that during the last months of 1932, quotations on the Batavia rubber market were stabilized at a level of from 7½ to 8 florin cents per ½ kilogram Java-Standard-Sheet. It was also reported that this price level continued over into January, 1933, and that only during the middle of the month, because Japan left the market, did a drop in prices occur. Within several days prices weakened to almost 6½ florin cents at which level — with the exception of the days just before the Chinese and Native holidays when prices momentarily rose to 7 florin cents — they stood during the entire month of February, with several minor fluctuations. Towards the end of February prices softened again to 6⅛ florin cents. During the beginning of March the downward trend in prices was halted as a result of rumours indicating that the Netherland Government was willing to study anew the subject of rubber restriction. Prices at Batavia accordingly rose to 6½ florin cents.

Although the aforementioned rumours were found to be based upon an incorrect interpretation of an official statement, prices were maintained and this may be explained also by the general attitude of waiting existing on the produce markets as a result of the acute financial developments in the United States. During the rest of March the Batavia quotations for Java-Standard-sheet fluctuated about 6½ florin cents per ½ kilogram.

The export of native rubber from Netherland India reacted sharply to the lower prices. Although the monthly exports during the last quarter of 1932 averaged from between 6,500 to 7,000 metric tons of dry rubber, during January exports fell to 4,864 metric tons. In February to 4,102 metric tons and in March to 4,454 metric tons. Quarterly exports of native rubber in terms of dry rubber equivalents, were as follows during 1932 and during the first quarter of 1933 :—

First Quarter 1932	—	15,942 metric tons.
Second Quarter 1932	—	10,613 metric tons.
Third Quarter 1932	—	14,443 metric tons.
Fourth Quarter 1932	—	20,283 metric tons.
First Quarter 1933	—	13,420 metric tons.

A study of these figures with the trend in prices indicates just how sharply exports reacted to prices. Roughly speaking the price trend at Batavia per ½ kilogram of Java-Standard-sheet was as follows :—

First Quarter, 1932	—	Sharp price drop from 11 to 6½ florin cents;
Second Quarter 1932	—	Further price drop from 6½ to 5½ florin cents;
Third Quarter 1932	—	Marked price increase from 5½ florin cents to 10 and 11 florin cents in the beginning of September and then drop to 8½ florin cents;
Fourth Quarter 1932	—	Price stabilization at 8 to 7½ florin cents;
First Quarter 1933	—	Price drop in mid-January and stabilization at 6½ florin cents.

If we now inspect the quarterly production figures for the "Small-holders" in British Malaya, we find that this production group, much more than has previously been the case, also reacted to the trend in prices, although admittedly not as sharply as was the case of the native production in Netherland India. Production was as follows in metric tons:

First Quarter 1932	—	45,138 metric tons.
Second Quarter 1932	—	37,419 metric tons.
Third Quarter 1932	—	46,253 metric tons.
Fourth Quarter 1932	—	51,053 metric tons.
First Quarter 1933	—	44,445 metric tons.

Not only the native producers of rubber in various countries pay attention to the market quotations. Under the present conditions the estate producers also show a much greater tendency to follow the price trends than before.

In Sumatra and in British Malaya this tendency is not shown very clearly due to the conditions affecting the labour supply but in Java, where conditions affecting labour are much more favourable, this tendency comes to the fore, as expressed, among other things, by the figures showing the areas not tapped by estates in Java. At the end of February, 1932, these areas totalled 21,546 hectares; they then increased steadily and by the end of August reached a high peak of 72,415 hectares: after August many plantings were again taken into tap, the areas out of tap being reduced regularly to total 29,344 hectares by the end of February, 1933.

The following are among the interesting points abstracted from reports from the various producing areas:

Acheen and Dependencies. The export of native rubber which in the previous quarter showed an increase by 36 metric tons of dry rubber equivalent, fell, largely because of the lower prices, to 12 metric tons of dry rubber. Exports during January totalled 5 metric tons; during February they totalled 4 metric tons and during March 3 metric tons.

Tapanoeli. The export from Sibolga during the first quarter of 1933 totalled 57 metric tons (dry) of sheets; about one metric ton of wet rubber was exported out of Tapanoeli overland through Sumatra East Coast. A remilling factory during the period under review worked about 70 metric tons. The prices, which during the first half of January still averaged about 8 florin cents, weakened continually and reached a low point of 5 florin cents on March 20. Thereafter business was done at 6 florin cents. Exploitation of the gardens was almost entirely stopped.

Sumatra West Coast. The export from the ports of the Sumatra West Coast Province totalled only one metric ton of dry rubber equivalent while shipments out of the province overland through Djambi totalled 131 metric tons of wet rubber and through Sumatra East Coast 126 metric tons of wet rubber.*

Of the 1933 first quarter exports, no reference is made to the rubber which came out of the Loeboek Sikaping and the Ophir districts. Tapping activities were curtailed in sympathy with the lower prices. These averaged about Fl. 2.40 at Soengai Dareh and Kota Baroe; from Fl. 1.60 to Fl. 1.30 at Bangkinang, prices being for 100 kilograms. Exploitation was largely done by means of family labour, while the tapping was done by boys from 13 to 17 years of age. Rubber is still of very small significance in the native economic scheme of things. It is even reported that in Bangkinang, near Kampar, about 50 hectares of rubber were cut down and the land planted with rice.

Palembang. The export of native rubber during the first quarter of 1933 included 3 metric tons of scraps and lumps and 1,303 metric tons of slabs, these figures being figures representing the dry weight equivalent. Tapping was carried on, among other places, in the L V Petoelai "margas" ("margas" equivalent to collection of villages), principally just before the rice harvest since the owners of the rubber gardens needed money to buy rice, and also a little bit in other "margas", for instance, in Lengi in Lematang Ilir in Tanjong Batoe and Moeara Koeang in Ogan Ilir in Moesi Ilir and in Moesi Oeloe.

Western Division of Borneo. The total export, expressed in terms of dry rubber equivalent amounted to 4,048 metric tons, which is about 180 metric tons more than was exported during the first quarter of 1932. Compared with the previous quarter, there is a decline in export of 784 metric tons which may be explained by the falling prices and by the fact that labour was required to work the food crops and was thus not available for tapping, the latter being stopped entirely even in the Sub-district of Upper Kapoeas.

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*In the Thirteenth Report the exports for the above exports during the fourth Quarter of 1932 were incorrectly given as 19.9 metric tons through Djambi and 18.8 metric tons through Sumatra East Coast. These exports were actually 199 and 188 metric tons respectively.

Wherever great scarcity of money was the rule, it was by no means uncommon for the adults to bring in the rice crop, while the children were sent out to tap.

Southern and Eastern Division of Borneo. The export, calculated in terms of dry rubber equivalent, fell from 3,733 metric tons during the fourth quarter of 1932 to 1,764 metric tons, which amount is just about equal to exports made during the second quarter of 1932. The formation of stocks did not generally take place so that the 1933 first quarter export gives a fair idea as to the amount of tapping done during that period. The cutting down of rubber trees for the purpose of using the ground for growing food crops took place on a limited scale in the hill and mountain country about Barabai.

Riouw and Dependencies. (Fourth Quarter 1932).

On the mainland (of Sumatra), the rubber gardens are found primarily in the upland areas and in the lowland areas the rubber cultivation is generally not of much importance to the population. The total export from these upland areas amounted to 1,251 metric tons (dry rubber equivalent) while the export from the islands of Riouw and Dependencies totalled 359.7 metric tons of wet rubber, which having a moisture content of 15%, gives a dry rubber total of 306 metric tons.

Departmental.

FROM THE DISTRICTS.

The Weather.

As usual June was a fairly dry month throughout the country. The rainfall returns indicate that little departure from normal was experienced in this respect anywhere. In many cases the precipitation figures were the result of a few heavy showers with long dry periods between. Malacca was the only place where the rainfall shows any appreciable departure from normal, being somewhat higher than is usual for the month. In Kelantan the month was wetter than during May.

Remarks on Crops

Rubber. The highest and lowest prices in dollars and cents per pikul recorded during the month in returns from a large number of centres throughout the country were—Smoked Sheet $10.00 to $15.25; Unsmoked Sheet $6.30 to $14.00; Scrap $2.00 to $6.00. The average Singapore price recorded for small-holders' rubber is—Smoked Sheet $13.50; Unsmoked Sheet $12.25 and Scrap $5.00 whilst Penang prices for Unsmoked Sheet ranged from $11.20 to $14.00 and for Scrap from $4.20 to $6.60.

Reports indicate that the further increase in price of the commodity has resulted in still further holdings being brought into tapping. Judging from roadside counts it would appear that in some areas, such as parts of Perak and Negri Sembilan, some 90 per cent. of the holdings are now in tapping. On the other hand, the Selangor report indicates that in some districts of that State many small-holders appear to be doubtful whether the price will be maintained and are at present unwilling to incur the expense of opening up rested holdings.

Padi. The price of padi at the Government Rice Mill at Bagan Serai still remains at $1.60 a pikul. It is reported that the Kedah price has shown a further slight increase.

Preliminary cultivation in preparation for the new padi season is reported from Kedah and from Province Wellesley, and the sowing of nurseries has commenced in parts of Krian and in North Perak generally. Similar activities are reported from Malacca, whilst transplanting is taking place in Negri Sembilan and the riverine mukims of Pahang. In Selangor, the short season crop, in areas where double cropping is being practised, is reported to be making good progress.

Coconuts and copra. Further sales of copra from approved kilns are reported from both the South and Central districts of Province Wellesley, and the possibilities of co-operative copra marketing were discussed at a District Economic Board Meeting held in that Settlement. In the Bagan Datoh area, the erection of improved kilns has made a little further progress. In Selangor,

further kilns have been erected in Kuala Langat district and the quality of the copra produced has shown a marked improvement, chiefly because the two main buyers operating refuse to accept anything but well prepared and satisfactorily dried copra. A high grade product continues to be turned out by the five 'kongsi' kilns in the Kuala Selangor district and the three in Sabak Bernam. The Sabak Bernam kilns are sending their product direct to Penang. The Malay officer who has been trained as a Copra Instructor was transferred to Temerloh at the end of the month in order to instruct a number of Malays in the proper methods of copra production. The small-holders concerned have erected a well designed clay-walled kiln on the banks of the Pahang river and, if the venture proves a success, it is likely that others will follow their example. Satisfactory arrangements have been made to despatch the copra made direct to Singapore for sale.

Coffee. Further details are to hand this month regarding the preparation by Malay small-holders of coffee in Kuala Langat district of Selangor. There are now eight Malay-run manufacturing centres scattered through the coffee growing areas; the average output from these is approximately 70 pikuls of prepared beans per month.

Tobacco. The Kedah report records that an area of about 70 acres is under this crop in that State. In Province Wellesley approximately 75 pikuls of cured leaf was sold, the price ranging between $29 and $42 per pikul according to quality. The interest in this crop is reported to be maintained in South Perak.

Agricultural Stations.

Towards the end of the month the Chief Field Officer visited the Pahang Agricultural Stations at Kuala Lipis and Temerloh. Records of distribution from Kuala Lipis station indicate that there is a distinct need for Agricultural Stations in Pahang to supply planting material. Reports indicate that the permanent crops of Selama station are now making satisfactory progress after a very slow start. At this station successful budding of Java clones of Kapok have been carried out. Similar satisfactory progress is reported from most of the other stations.

Padi Experiment Stations and Test Plots.

Renewed activity in preparation for the coming crop is reported from all parts of the country, and on most padi stations nurseries have been prepared and sown. At Bukit Merah, in Province Wellesley, experimental trials with mushrooms are meeting with a certain amount of success.

DEPARTMENTAL NOTES.

Visits and Tours.

The Chief Research Officer visited Province Wellesley and Negri Sembilan during May 1933 in connection with soil and manurial problems relating to coconut palms.

The Acting Agricultural Chemist, Major C. D. V. Georgi, O.B.E., visited Singapore on May 1st. in connection with matters relating to palm oil, jelutong and tuba root.

School of Agriculture, Malaya.

Forty seven students were in residence at the School at the end of May and three more will arrive at the end of June or early in July. Two of the students have been selected from candidates for the two scholarships created by the Jaffnese Co-operative Society Ltd. The enrolment of private students for the present School year has been satisfactory.

The two Brunei and two Kelantan pupils, who completed the one year course last April, have been given special instruction in copra production at Klang etc., by arrangement with the Agricultural Field Officer, during the first half of May. The Kelantan boys then spent a week in Malacca gaining experience on Agricultural Stations, under the Agricultural Field Officer, and have since returned to Kelantan, while the Brunei boys spent a fortnight at Kuala Kangsar, to gain experience in poultry, and will spend the next two months at Malacca.

A party of boys from the Methodist Boys' School, Kuala Lumpur, was conducted round the School on 24th May.

The Rural Lecture Caravan.

The Rural Lecture Caravan toured Negri Sembilan during April and the first week in May 1933.

The Caravan then proceeded to Province Wellesley and toured the State during May and the first week of June 1933.

Award of the Certificate of Honour to Enche Abdul Jalil bin Haji Hassan.

In the name of His Majesty the King, His Excellency the High Commissioner has been pleased to award the Certificate of Honour to Enche Abdul Jalil bin Haji Hassan formerly Malay Agricultural Subordinate, Grade I, in the Department of Agriculture, S.S. and F.M.S.

Visitor to the Department.

Prof. F. L. Engledow, M.A., paid a visit to the Headquarters of the Department of Agriculture, Kuala Lumpur, on June 23rd, 1933, and inspected the laboratories and discussed matters relating to agricultural problems with the Director and the Senior Staff.

Prof. Engledow accompanied by the Agriculturist, Mr. Bunting, visited the Government Experimental Plantation, Serdang, during the afternoon of June 23rd, and inspected the School of Agriculture, the Dairy Farm and the experimental work on crops in progress on the plantation.

Leave and Staff Changes.

Mr. H. D. Meads, formerly Assistant to Statistician, has been appointed Personal Assistant to the Director of Agriculture, S.S. and F.M.S., with effect from June 6th 1933.

Mr. W. G. Higgins has been appointed to succeed Mr. Meads as Assistant to Statistician with effect from June 6th 1933.

Mr. W. N. C. Belgrave, Chief Research Officer, has been granted full pay leave of 10 months from 15th June 1933 to 14th April, 1934.

Mr. G. H. Corbett, Government Entomologist has been granted full pay leave of 9 months and 11 days from 23rd. June, 1933 to 2nd April 1934.

CERTIFICATE OF HONOUR TO INCHE ABDUL JALIL BIN HAJI HASSAN.

It is a pleasure to record in this Journal that Inche Abdul Jalil bin Haji Hassan was selected for the award of a Certificate of Honour on the occasion of the birthday of His Majesty the King on June 3rd, 1933.

Inche Jalil was born at Alor Gajah in 1876 and entered the service of Government as Malay Assistant to the District Officer, Kuala Pilah, on February 6th, 1903. He joined the Department of Agriculture as Sub-Inspector of Coconuts on March 1st, 1907 and retired from the Department's service as as Malay Agricultural Subordinate, Grade I, on January 1st, 1933. Thus he spent 30 years in Government service, 26 years being in the service of the Department of Agriculture.

It is on record that early in his service he gained the reputation of being an officer who could be relied upon to spare no effort to carry out any work assigned him to the best of his ability, and this reputation he has retained throughout his service.

Inche Jalil rendered specially creditable assistance to this Department on several occasions. In 1914—15 he was of particular value in tracing and reporting swarms of locusts and organising Malay gangs to deal with them. Similarly, in the 1924—25 padi season his recognised persuasive powers and influence with the small-holders, and with the headmen, in Kuala Pilah district was an important factor in the successful organisation of gangs to deal with the Leptocorisa (Pianggang) pest of padi which threatened the spoilation of the crop. Of more recent years he has, by precept and example, encouraged the planting of high yielding pure strains of padi in Kuala Pilah district with success.

For the past twelve years Inche Jalil has served under Mr. Barnes, Acting Agricultural Field Officer, Negri Sembilan, who speaks highly of Inche Jalil's reliability, intimate knowledge of his district and ability to work in close co operation with the small-holders and headmen with whom he came in contact, three important attributes in the case of an Agricultural Officer.

Statistical.

MARKET PRICES

May 1933.

Rubber.—The market price for rubber has been fairly steady during the month, opening at 11¼ cents per lb. for Spot loose in Singapore and closing at 11¼. The average price for the month was 10 15/16 cents per lb. in Singapore 3⅜ pence in London and 6 cents Gold in New York, as compared with 9.08 cents, 2.87 pence and 4.8 cents Gold respectively in May.

Palm Oil.—The course of the English market during June on a basis of 18 per cent. f.f.a., c.i.f. Liverpool was as follows :—

June 1st £18 per ton market steady : 7th £18; 14th £18; 21st £17 market quiet; 28th £17.10 market steady. Prices in the U.S.A. landed weight per pound in bulk c.i.f. New York/Philadelphia were 3.40 cents Gold on the 14th and 3.25 cents Gold on the 26th.

The price of palm kernels Fair Average Malayan Quality c.i.f. landed weight on the Continent fell from Shillings 9/7½ per cwt. on the 1st to Shillings 8/9 per cwt. on the 21st.

Copra.—There was a steady fall in the price from the 12th. The highest Singapore price for Sundried during June was $4.40 per picul on the 7th., the average price being $4.13 per picul as compared with $3.96 during May. The mixed quality averaged $3.74 per picul as compared with $3.70 per picul in May.

Coffee.—During the month the price at Singapore for Sourabaya coffee increased slightly, ranging according to grade from $21.50 to $24 as compared with $20 to $22.50 during May. Palembang coffee averaged $13.90 during the month having dropped from $15 on the 1st to $13 on the 29th. The average figure for May was $16.87.

Arecanuts.—Palembangs averaged $2.33 and Bila Whole $2.66 per picul as compared with $2.61 and $2.86 respectively during May. The range of Singapore prices for other grades were :—Split $3.25 to $5.25, Red Whole $4.50 to $5.50 Sliced $7 to $8, Kelantan $4.30 to $4.50.

Gambier.—Block Gambier declined in price towards the end of the month, the average price being $4.64 per picul, cube average $7.40. Corresponding figures for May were $3.94 and $7.50 per picul respectively.

Pineapples.—Values firmed somewhat during June the average Singapore per case being Cubes $3.09, Sliced Flat $3.00, Sliced Tall $3.22, as compared with $2.85, $2.75 and $2.29 respectively during May.

Tapioca.—The price of Flake average $4.12 as compared with $4.36 in May. Pearl Seed averaged $5.37 as compared with $5.06 in May and Pearl Medium average $5.62 as compared with $5.31 in the previous month.

Sago.—Pearl Seed Fair remained steady at $4.75 as compared with $4.40. Flour Sarawak Fair averaged $1.90 as compared with $1.85 in May.

Mace.—Average prices were $65 per picul for Siouw and $45 for Amboina, a considerable increase from prices ruling during May which were $60.50 and $38 respectively.

Nutmegs.—Prices increased from the ruling figures for May. Singapore price per picul for 110's was $22.75 as compared with $18.12 in May, 80's increased to $31.50 having remained steady at $24.25 in the previous month.

Pepper.—Average Singapore prices during June were as follows:—Singapore Black $17.75 per picul, Singapore White $29 and Muntok White $29.75, the corresponding prices for May were $15.25, $24.87 and $26.62 respectively.

Cloves.—As in May there has been small demand for cloves, nominal prices being $40 for Zanzibar and $45 per picul for Amboina.

GENERAL RICE SUMMARY.

May 1933.

Malaya.—Gross foreign imports of rice (including stocks available for re-export) during May 1933, amounted to 49,838 tons, as compared with 38,225 tons in May 1932, of which 51 per cent. were consigned to Singapore, 20 per cent. to Penang, 7 per cent. to Malacca, 18 per cent. to the Federated Malay States and 4 per cent. to the Unfederated Malay States.

Of these imports, 59 per cent. were from Siam, 37 per cent. from Burma, 2 per cent. from Indo-China and 2 per cent. from other countries.

Total foreign exports of rice from Malaya in May 1933, were 11,440 tons (including 391 tons local production) as compared with 12,557 tons in May 1932.

Of these exports 82 per cent. were consgined to Netherlands India and 18 per cent. to other countries.

Net imports for the period January to May 1933, were 169,081 tons as compared with 165,207 tons during the same period for 1932, an increase of 2 per cent.

India and Burma.—Total foreign exports of rice during April 1933, were 205,000 tons as compared with 277,000 tons in the previous month and 231 tons in April 1932.

Total exports of rice and bran from Burma during the period January 1st to April 29th amounted to 1,192,866 tons as compared with 1,374,727 tons for the corresponding period in 1932, a decrease of 13.2 per cent.

Siam.—Exports (approximate) during May 1933, amounted to 127,356 tons as compared with 123,458 tons in May 1932.

Netherlands India, Java and Madura.—At the end of April 1933, the area harvested amounted to 2,651,000 acres a decrease of 13,000 acres or 1 per cent. as compared with the corresponding period of 1932: the area damaged was 79,000 acres a decrease of 4,000 acres or 5. per cent. as compared with 1932, and additional plantings awaiting harvesting amounted to 5,787,000 acres an increase of 154,000 acres or 3 per cent.

French Indo-China.—Entries of padi at the port of Cholon from January to May 1933, amounted to 559,265 (metric tons, an increase of 9,173 tons or 2 per cent. as compared with the same period of 1932.

Exports of rice from Saigon for the period January to May 1933, totalled 652,116 tons, an increase of 118,944 tons or 22 per cent. as compared with the corresponding period of 1932.

Of these imports 21 per cent. were from British India, 72 per cent. from Burma, and 7 per cent. from other countries.

Europe and America.—Quantities of rice shipped from the East were :—

(*a*) To Europe for the period January 1st to May 25th, 640,554 tons, a rise of 189,771 tons or 42 per cent. as compared with the same period of 1932. Of these shipments 50 per cent. were from Burma, nil from Japan, 39 per cent. from Saigon, 6 per cent. from Siam and 1 per cent. from Bengal as compared with 61 per cent. from Burma, nil from Japan, 32 per cent. from Saigon, 2 per cent. from Siam and 5 per cent. from Bengal in 1932.

(*b*) To the Levant, period January 1st to April 12th, 15,156 tons, a fall of 17,580 tons or 54 per cent. as compared with the same period of 1932.

(*c*) To America and the West Indies for the period January 1st to April 27th 1933, 41,492 tons a decrease of 12,517 tons or 23 per cent. as compared with the same period of 1932.

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING MAY, 1933.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1932	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING		Total (3) + (5)	Percentage of (7) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
STRAITS SETTLEMENTS :—							
Province Wellesley	44,734	2,018	4.5	8,516	19.0	10,534	23.5
Dindings	6,969	404	5.8	927	13.3	1,331	19.1
Malacca	111,780	5,540	5.0	20,834	18.6	26,374	23.6
Penang Island	1,635	977	59.7	52	3.2	1,029	62.9
Singapore Island	28,269	11,580	41.0	4,657	16.5	16,237	57.4
Total S.S. ...	193,387	20,519	10.6	34,986	18.1	55,505	28.7
FEDERATED MALAY STATES :—							
Perak	250,951	11,749	4.7	34,990	13.9	46,739	18.6
Selangor	308,379	19,749	6.4	40,922	13.3	60,671	19.7
Negri Sembilan	228,541	16,214	7.1	20,131	8.8	36,345	15.9
Pahang	38,141	8,928	23.4	4,802	12.6	13,730	36.0
Total F.M.S. ...	826,012	56,640	6.9	100,845	12.2	157,485	19.1
UNFEDERATED MALAY STATES :—							
Johore	325,747	41,169	12.6	31,820	9.8	72,989	22.4
Kedah (*a*)	114,551	8,909	7.8	6,985	6.1	15,894	13.9
Kelantan	21,175	8,126	38.4	1,985	9.4	10,111	47.8
Trengganu (*b*)	4,352	Nil	Nil	2,072	47.6	2,072	47.6
Perlis (*a*)	957	106	11.1	502	52.5	608	63.5
Total U.M.S. ...	466,782	58,310	12.5	43,364	9.3	101,674	21.8
TOTAL MALAYA ...	1,486,181	135,469	9.1	179,195	12.1	314,664	21.2

Notes :— (*a*) Registered companies only and are rendered quarterly.

(*b*) Registered companies only.

The above table together with a Summary, was prepared and published by the Statistics Department, S.S. and F.M.S. in June 1933.

MALAYAN AGRICULTURAL EXPORTS, MAY, 1933.

PRODUCT.	Net Export in Tons.				
	Year 1932	Jan.-May 1932	Jan.-May 1933	May 1932	May 1933
Arecanuts ...	20,280	10,620	9,185	1,522	1,236
Coconuts, fresh ...	108,123†	40,134	37,665	6,966	7,013
Coconut Oil ...	11,932	4,262	7,907	763	1,595
Copra ...	97,464	28,568	35,751	4,542	6,591
Gambier, all kinds ...	2,925	1,278	1,040	262	291
Palm kernels ...	1,248	486	612	186	194
Palm oil ...	7,892	2,751	3,753	824	1,452
Pineapples, canned ...	66,291	31,065	24,577	8,522	6,942
Rubber § ...	417,137	150,342	149,653	30,234	33,461
Sago,—flour ...	10,267	4,116	1,836	337*	307
„ —pearl ...	3,128	1,126	886	273	221
„ —raw ...	4,148*	1,461*	1,644*	188*	271*
Tapioca,—flake ...	9,028	3,926	5,112	834	977
„ —flour ...	392	76*	181*	32	137*
„ —pearl ...	19,977	8,484	6,952	1,899	1,352
Tuba root ...	165½	49½	182	8	56

† hundred in number. § production. * net imports.

ACREAGES OF TAPPABLE RUBBER OUT OF TAPPING IN NETHERLANDS INDIA, AT END FEBRUARY, 1933.

	A Totally Ceased.		B Partly Ceased.		Total A & B	
	Estates	Area in acres	Estates	Area in acres	Estates	Area in acres
Java and Madura ...	135	55,000	66	17,480	201	72,480
Outer Provinces ...	198	70,296	70	40,315	268	110,611
Netherlands India ...	333	125,296	136	57,795	469	183,091

The total area out of tapping for February amounts to 18.8 per cent. of the total tappable area at end of December, 1932.

(Authority: Economisch Weekblad, page 1801, dated 28th April, 1933).

MALAYA RUBBER STATISTICS — TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF MAY, 1933 IN DRY TONS.

Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month		
	Ports	Dealers	Estates of 100 acres and over	during the month	January to May 1933	during the month	January to May 1933	during the month		January to May 1933		during the month		January to May 1933		Ports	Dealers	Estates of 100 acres and over
								Foreign	From Malay States Labuan	Foreign	From Malay States Labuan	Foreign	Local	Foreign	Local			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MALAY STATES :—																		
Federated Malay States ...	...	12,036	10,394	10,827	52,860	9,331	38,455	Nil	Nil	Nil	Nil	14,163	5,018	67,203	28,603	...	12,729	10,664
Johore ...	...	2,688	3,243	3,745	17,241	4,661	20,702	Nil	6	Nil	17	1,283	6,946	5,239	32,609	...	2,820	3,294
Kedah ...	...	455	1,969	2,405	10,950	1,432	5,833	2	Nil	2	Nil	956	2,765	5,487	12,022	...	495	2,047
Perlis ...	...	25	12	10	41	10	39	Nil	Nil	Nil	Nil	Nil	23	Nil	91	...	24	10
Kelantan ...	...	199	155	161	710	644	2,010	75	Nil	75	Nil	82	727	372	2,279	...	287	138
Trengganu ...	...	55	50	157	542	78	270	Nil	Nil	Nil	Nil	Nil	235	Nil	812	..	55	50
Total Malay States	...	15,458	15,823	17,305	82,344	16,156	67,309	77	6	77	17	16,484	15,714	78,301	76,416	...	16,410	16,203
STRAITS SETTLEMENTS :-																		
Malacca ...	...	4,349	1,396	1,306	6,280	2,245	9,733	Nil	15,772	9	76,587	3,755	Nil	21,257	Nil	...	3,902	1,373
Province Wellesley	...	893	474	524	2,348			Nil		Nil						...	955	517
Dindings ...	...	35	95	92	458			Nil		Nil		5,093		30,608		...	32	99
Penang ...	517	4,419	6	3	9			588		2,393						1,362	3,940	5
Singapore ...	2,797	20,510	139	162	714			9,932		31,347		17,516		75,656		3,131	24,554	134
Total Straits Settlements	3,314	30,206	2,110	2,087	9,809	2,245	9,733	10,520	15,772	33,749	76,587	26,364	Nil	127,521	Nil	4,493	33,383	2,128
TOTAL MALAYA	3,314	45,664	17,933	19,392	92,153	18,401	77,042	10,597	15,778	33,826	76,604	42,848	15,714	205,822	76,416	4,493	49,793	18,331

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Total
20	21	22	23	24	25	26
DRY RUBBER	9,556	20,635	3,432	4,749	1,028	138
WET RUBBER	3,173	3,919	508	140	1,792	357
TOTAL ...	12,729	24,554	3,940	4,889	2,820	495

TABLE III
FOREIGN EXPORTS

PORTS	For month	January to April inc. 1933
Singapore ...	26,970	119,634
Penang ...	8,431	48,360
Port Swettenham.	6,437	31,080
Malacca ...	1,010	6,748
MALAYA ...	42,848	205,822

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	January to April inc. 1933
Malay States ... / Straits Settlements	34,534	173,398
MALAYA ...	34,534	173,398

Notes :—1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.

2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month. + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + 14 tons local consumption during the month —[2]—[3]—[4]—[5]—[9]—[10]. For the Straits Settlements, Columns [7] and [8] represent purchases by dealers from local estates of less than 100 acres, reduced by 15% to terms of dry rubber.

3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15%; wet sheet, 25%; scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.

4. Domestic exports are estimated by deducting the average monthly dry weight of foreign imports over a period of 2 months from the gross foreign exports of the later month, the foreign exports of the Malay States being domestic production.

5. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 22nd June 1933.

METEOROLOGICAL SUMMARY, MALAYA, MAY, 1933.

Locality	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine		
	Means of			Absolute Extremes						Total		Most in a day	Number of days					Total	Daily Mean	Per cent
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation .05 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						hr.	hr.	%
Railway Hill, Kuala Lumpur, Selangor ...	91.2	73.3	82.3	94	71	86	75	85.0	85.3	13.93	353.8	2.25	24	22	15	6		187.95	6.06	49
Bukit Jeram, Selangor ...	88.4	73.5	80.9	92	71	84	75	85.0	86.3	3.20	81.3	0.98	12	8	4			224.75	7.25	59
Sitiawan, Perak ...	91.3	73.9	82.6	96	72	85	78	85.5	85.9	3.47	88.1	1.77	15	12	5	2		221.65	7.15	58
Kroh, Perak ...	88.9	70.8	79.9	93	64	85	73	83.3	83.4	10.55	268.0	3.16	18	16	2	5		229.20	7.39	60
Temerloh, Pahang ...	91.0	73.8	82.4	93	71	89	76	86.1	86.4	13.20	335.3	3.94	18	14	3			224.90	7.25	59
Kuala Lipis, Pahang ...	89.8	72.4	81.1	92	70	88	75	84.8	85.0	12.08	306.8	3.44	21	17	2	17		206.15	6.65	54
Kuala Pahang, Pahang ...	87.7	74.5	81.1	91	72	86	77	86.6	86.1	4.01	101.9	1.21	15	11	1			234.85	7.58	61
Mount Faber, Singapore ...	88.7	75.3	82.0	93	72	83	80	82.8	83.1	6.29	159.8	1.87	14	10	6			189.80	6.12	50
Butterworth, Province Wellesley ...	89.5	75.1	82.3	92	73	88	77	86.0	85.8	7.58	192.5	2.62	14	10	2	1		258.80	8.35	68
Bukit China, Malacca ...	86.2	74.5	80.3	92	72	82	77	84.1	84.8	3.60	91.5	0.64	14	10	4			200.75	6.48	53
Kluang, Johore ...	89.3	72.3	80.8	93	70	85	75	83.1	82.9	8.78	223.0	1.58	21	19	7	18		204.25	6.59	54
Bukit Lalang, Mersing, Johore	88.7	72.9	80.8	91	71	85	75	83.4	82.8	5.60	142.3	3.22	14	10	1	1		244.60	7.89	66
Alor Star, Kedah ...	90.3	74.7	82.5	94	72	87	77	87.4	86.6	5.87	149.1	1.25	18	16	9			255.70	8.25	67
Kota Bahru, Kelantan ...	90.4	74.7	82.5	94	73	86	76	85.6	84.9	0.46	11.7	0.20	9	3				260.90	8.42	65
Kuala Trengganu, Trengganu	89.2	73.8	81.5	92	72	86	76	84.7	85.1	4.39	111.5	1.74	10	7	1	2		248.20	8.01	65
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. Pahang ...	75.2	64.0	69.6	80	62	72	66	72.5	72.4	16.21	411.7	4.27	26	21	2	7		149.60	4.83	39
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	74.3	57.9	66.1	78	52	71	62	70.4	69.7	13.74	349.0	2.29	23	21	13	1		166.00	5.35	43
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	73.3	60.5	66.9	78	59	69	62			14.34	364.3	1.88	23	20		1		175.65	5.67	46

Compiled from Returns supplied by the Meteorological Branch, Malaya.